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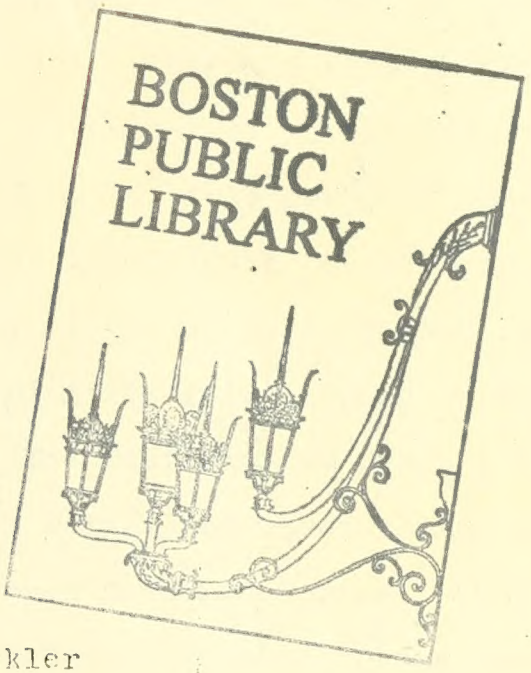
Calf Pasture Pumping Station



Arch I - 3b
Prof. Eduard F. Sekler

Submitted by:
Stuart Marwell
Andrew Rudak
Bryan Burke

Circa 1973/74

~~1968-70?~~

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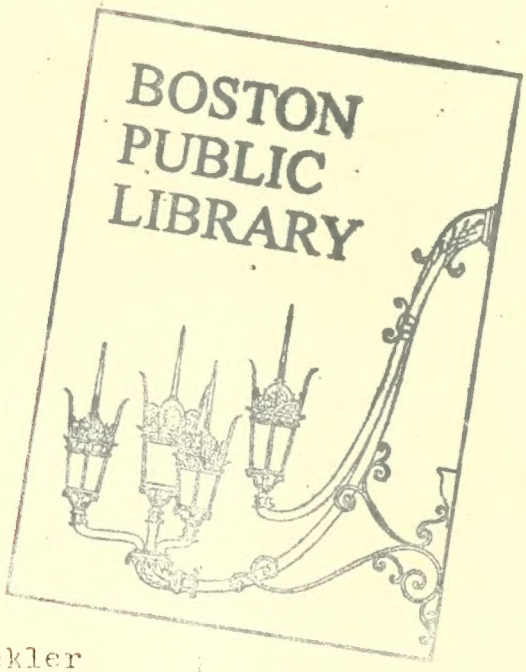

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CALF PASTURE PUMPING STATION

Situated at the tip of what is now Columbia Point, Dorchester, is a large granite building known as the Calf Pasture Pumping Station. Once the heart of the Boston Sewerage System, it now stands virtually idle and in disrepair. It is a building that easily attracts the attention of passers by because, in contrast to the new University of Massachusetts buildings and the Columbia Point housing project, it looms like a dinosaur, a remnant of a building style and tradition long since gone. It was this contrast that caught our attention and brought us to investigate the history of this structure.

Fig. 1

A study of the pumping station cannot be made without first outlining its relationship to the immense system which it served. The Calf Pasture Pumping Station was the keystone of a complex network of sewerage and drainage known as the Boston Improved Sewerage System. This system was designed to drain all of Boston's sewerage and transport it through a tunnel to Moon Island for settling in a reservoir and then into the harbor.

From its founding until the year 1823, Boston was known as the town of Boston. It did not have what could be considered a municipal government and, as a result, had little in the way of public services. Sewerage and drainage was left up to the individuals or to private contractors who constructed drains

ditch or pipe line to the nearest body of water, the harbor or the Charles River, and drained his house and his land into it. At this time, little or no fecal waste was drained into the surrounding waters because the water closet was not yet in use in Boston.

In 1823, Boston received a city charter and the municipal government began to exercise some control and take some responsibility for the drainage of the city. Most of this control took the form of regulations to limit the amount and quality of drainage construction by private contractors. From 1800 to 1823, the city of Boston grew tremendously due to filling operations carried on in Back Bay, South Bay, the Roxbury Canal area and along the harbor where Commercial Wharf
Fig. 2 is today. The areas filled were tidal flats or swamps that originally almost made the city an island except for the neck that connected Boston to the Town of Roxbury. Drainage in Boston before such filling was easy, as in general the city was made up of a series of hills including Beacon, Port and Copps Hills. Gravity took care of everything.

With the extension of city boundries into the tidal flats, a serious problem arose. The old sewers and ditches could not be allowed to empty into the prestigious land areas newly created. They had to be extended under the fill until they reached the new banks of the river or harbor. Because the new land was only five to ten feet above high tide levels and nearly all houses drained from pipes located in the basement of [illegible] [illegible] [illegible] [illegible] [illegible]

done before. Only at low tides was gravity sufficient to carry away the wastes of the city. As the tide rose, float operated tidal gates closed off the mouth of the sewers in order to keep the rising sea level from forcing the foul water back into the houses from which it came. When the water gates were shut, sewerage backed up into the houses closest to the gates as sewerage pressure built up from sources at higher levels. Also solid wastes that would normally be carried along by the current in the drain would settle to the bottom of the line, eventually causing putrification of the materials. At low tide, the gates would open allowing the damned up waters to rush out into the bay or river, carrying with them large quantities of settled muck. The outrushing waters would then meet the incoming tides and instead of being carried away would be piled up against the shore. This large accumulation of decaying garbage began to decompose and, especially during summer months, would create an absolutely unbearable stench. It was only compounded by the introduction of fecal waste in the 1840's with the installation of water closets in city homes.

There are many accounts of this both in official documents and even in popular fiction. The City Board of Health reported, "large territories have been at once, and frequently, enveloped in an atmosphere of stench so strong as to arouse the sleeping, terrify the weak, and nauseate and exasperate everybody."[1] In the book, The Rise and Fall of Silas Lapham, there are extensive accounts of what each day was like on hot

[illegible] and how those who [illegible] would flee the city for the fresh air of Cape Cod or the North Shore.

[illegible] were made to remedy the situation, but they [illegible] avoid the unpleasant situation due to the tidal [illegible]. If one had to, one could live with the stench of the sewerage, but one could not live with the cholera, diptheria, and typhoid that soon began to claim the lives of a great number of Boston's citizens. Outbreaks of such disease were becoming more prevelant as time went on, especially amongst the new immigrants from Europe, who lived in close, unsanitary conditions in the areas now known as Roxbury and the South End.

Finally in 1872, the state legislature passed an act that authorized the City of Boston to create a commission to investigate an improved system of drainage for the metropolitan area.[2] Boston rejected this idea, insisting that neighboring towns should share in the cost. Later, in 1874, the City Council, at the urging of the Board of Health, did enact such a commission. The early dispute about who would pay the bill for such a commission was the direct cause for the eventual establishment of the Metropolitan District Commission.

A reference to the solution proposed by the commission composed of Messrs. Chesbrough, Moses, Lane and Charles Folsom, M.D. in the City Council records has these words in the preface - "The prevention of filth infection in its various forms constitutes without a doubt the greatest and most [illegible] of Boston."[3] This commission in its report

of 1874, suggests that the city has only two possible solutio

One would be to raise the level of all filled sewer areas in the city so that gravity drainage could once again be used regardless of the tidal situation. The cost of raising nearly one half the city's land would have been prohibitive. The other and more feasible solution was to drain the sewerage to some distant point and then discharge it, after settling out the solids, into the ocean at a point where currents would carry it out to sea and not back onto Boston's shores.

There were many arguments that the city had a great source for fertilizer in its present waste system and felt that it should be used as a source of revenue for the city. Others were still skeptical of the workability of the newly suggested system due to its dependence on large steam pumps. They still did not have confidence in the machine. In a letter from George A. Cabot, president of the Boston Architectural Society, the fear of a lowered water table and the resulting decay of shallow wood pilings in Back Bay that support most of the structures in that area was expressed as an argument against the new system. Pressure from Boston public health officers and politicians like Alderman Burrage, who in a petition to City Council in 1876, stated

> We, the undersigned citizens and property holders in [illegible], respectfully represent that the present inadequate and unsanitary system of sewerage is an occasion of alarm to us and to our families, is affecting injuriously our

> [illegible] as well as the value of our property [illegible] calculated to retard the growth of the city and otherwise affect adversely its welfare. [illegible], believing that such comprehensive [illegible] is of paramount importance, we earnestly [illegible] that you will at the earliest possible day, take such action as will secure to us and to the city the benefits of the same.[5]

[illegible] the city government into making a commitment to an improved sewerage system.

On July 21, 1876, the City Engineer, Joseph P. Davis began the survey and investigations which were necessary to begin work on a new system. As in much American History, Bostonians lacked confidence and previous experience and so looked to Europe for the answers to their problems. In September of 1876, after much debate, Mr. Davis was granted one thousand pounds to go to Europe to study systems then in use in major cities.[6] Upon his return in 1878, detailed plans for the new system were developed. A peripheral system of large intercepting sewers were to intersect the old lines that ran out into the tidal flats. These intercepting sewers would carry the sewerage to a common main line which ran down Mt. Vernon Street to Old Harbor Point, now Columbia Point. At the tip of Old Harbor Point were to be located three buildings. They included a gate house which would regulate the flow of sewerage, a screening house which would filter out large solid waste and objects, like tree limbs, cans, etc. which might damage the pumps, and a pump house which would pump the sewerage through a tunnel under Boston Harbor to reservoirs at Moon Island which settle the sewerage and then discharge it

Fig. 3

Fig. 4 thru 7

large pumps were required for this system because of the height to which the sewerage had to be raised at Moon Island. The system worked on gravity feed all the way to the pump house. This meant that the intercepting sewers had to be lower than the tidal areas and the main drain had to be lower than the intercepting sewers. By the time the sewerage reached the pumping station, it was already fourteen feet below low tide. From the pumping station it travelled through a tunnel 140 feet below tide level and then some thirteen feet to the reservoir at Moon Island. Effectively, the pumps had to raise the material some forty feet.

The pumps were only one interesting aspect of the machinery
Fig. 9 involved in this system. Perhaps the quaintest was a large excavating machine, one of the first of its kind patented by the superintendent of construction, H. A. Carson. It was perhaps the first excavating machine to be used. It was on the average two hundred feet long, constructed of timber, and ran on its own steam power along a wooden rail. The main reason for developing it was the public uproar that resulted from delays due to the disruption of traffic when the streets of the city were dug up. A contemporary account of this machine is of some interest because it shows the great interest the people of the times had in power of machinery.

> In its general features the apparatus consisted of a light frame structure extending over the sewer trench from a point in advance of where excavation had begun, to another behind where the trench was completely backfilled. All [illegible] on beneath the [illegible]

... frame, the sewer was built under the central portion and back filling progressed ... A double drum hoisting engine ... at the front end of the frame. From the top of the frame were suspended ... which were travellers moved backwards and forwards by wire ropes leading to the engine. A number of tubs loaded by the diggers in front were hoisted simultaneously by the engine and run back to be dumped over the completed ... These returned and lowered to the points whence they had been taken, by which time a second set of tubs had been filled ready for hoisting.

Any surplus earth was dumped through a hopper into carts which were backed under the machine. When it was necessary to furnish a passage across the work, the trench was bridged and the frame trussed. When one section of excavation was completed the whole apparatus, which rested on wheels, was pulled forward thirty or more feet by its own engine.

Fig. 10

Fig. 11

System construction along with Calf Pasture Pumping Station was completed in late 1883, and the sewerage system went into operation at this time. The reason for dwelling for such a long time on the historical background of the pumping station is that the elements which produced the pumping station provide a very good picture of the way of life and the development of the constructive technology in America at this time.

Unfortunately, there is a dearth of historical information on the design and construction of the Calf Pasture Pumping Station. It was not the sort of thing that Prohmin Society discussed or expected to read about in their newspapers or magazines. References to the system can be found in some magazines such as Architect's and Builder's ... of the 1880's, but no references to the building itself

time was apparently directed only at the system and its machinery and not at its pumping station. The only reference to it in descriptions of the system is - "Above their foundations all buildings at the pumping station were designed and built by the City Architect's Department. This building (sic.) cost about $300,000."[9]

Veiled references to the pumping station found in the records of City Council proceedings and information gathered by interviewing people currently connected with the system support a sketchy history.

On January 28, 1878, an Alderman of the City of Boston announced that the land had been obtained at Harbor Point for the purpose of establishing the pumping station. It was noted that this location was more than a mile away from the nearest home.[10] The next reference to the pumping station came in early April, 1882, when the new City Engineer, Henry M. Wightmen asked for a variance on zoning regulations in order to construct a building at Harbor Point which exceeded the legal size permitted in that area.[11] Again later in that year on April 24, 1882, an urgent request for additional funds for the construction of the pump house was made.[12] The pumps were apparently already in place and were covered by a wooden shack. The persistent danger of fire made it necessary to cover the pumps with a fire-proof structure at the earliest possible date. The machinery installed at Old Harbor Point was the key to the much needed sewerage system should fire destroy them, [illegible]

No records of the construction period could be located and even the completion date is somewhat of a mystery. A date-stone located over the main entrance to the pumping station reads 1883, but it is hard to discern if this was the date the station was completed, or the date that the stone was laid. It is known however, that the station became operational on January 1, 1884, and it can be assumed that the pumping station was completed by this date.

The only existing original drawings of the pumping station are two elevations of the building.[13] One is signed by Lucius Slade, Chairman of the City Council's Joint Special Commission on Improved Sewerage and the other is signed by George A. Clough, and is dated August 1, 1881. These elevations show what must have been an early proposal for the form of the building. With some minor differences, this is what was actually built. Plans for the pumping station published in 1885,[14] show that it consisted of three main elements: a pumping room, a boiler house, and a coal house. Provisions were made for future growth in all three areas. The original elevations depict a second chimney one hundred and forty feet high at the coal house and it is known that only the first section was ever built. In 1905, the pump house was extended as intended and was the only addition made to the building.[15]

Fig. 12 and 13

Fig. 14

Fig. 15

This addition was made to accommodate a new gigantic pump, the world's largest, designed by an engineer named [illegible][16]

of grease stains from the giant wheel can still be seen today on the brick work near where it spun. Due to differential settling of the foundation, the giant rocker arm (twelve inches of solid steel rod) cracked and in 1940 the pump was dismantled and sold for scrap.

In 1946, the roof of the coal room collapsed and the
Fig. 18 rest of the room demolished. The loss was considered inconsequential and did not interfere with the operation of the plant because the conversion from coal to oil had been made at some point before the collapse.

Just as the history of the building is shrouded in mystery, very little is known about the architect or whether in fact, there was an architect. The only hint to help identify the author of the building is the elevation signed
Fig. 13 by George A. Clough as City Architect. It is not known if he signed the plan in the role of architect, or if he merely approved plans which were the product of some anonymous designer in the city's draughting room. However, several references to George A. Clough in the City Council records tie him to the pumping station, a connection which does little to enhance the reputation of the building. Because of this connection and the possibility that he actually was the designer, an investigation of Clough is presented.

On February 12, 1880, George Clough was elected Boston's first City Architect.[17] It is possible that prior to holding this position he was the Commissioner of Sewers for the city

the building at Parker Point. His term of office as City Architect was short-lived because on February 26, 1883, he was defeated in the annual election.[18] During his reign he was apparently responsible for the Boston Latin and English Schools and for a building known as the Marcella Street Home.

There were apparently two main reasons why Clough was defeated as City Architect. Both these reasons surface in the lengthy debates about the merit of the man as an architect which preceded the 1883 election. In a diatribe directed against George Clough, an alderman of the City Council denounced him on two accounts. First, he argued, that one of Clough's primary obligations as City Architect was to do something about improving the ventilation of the Council Chambers at City Hall. Apparently they were absolutely unbearable in the summer heat. He failed to remedy the situation which led the alderman to doubt his ability as an architect.[19] The second basis for his rejection had to do with some political intrigue concerning the pumping station in which Clough was apparently involved.

Tracing the City Council proceedings reveals consistent feelings, probably political and economically motivated, that the labor hired for construction should be limited exclusively to citizens of Boston and no one else. Apparently while City Architect, Clough fired all the masons working at the pumping station on the pretext that they were from

men of his own selection who, according to the alderman's account were good-for-nothings who did nothing but hang around City Hall drinking, smoking and talking to their cronies. In addition to [illegible] with [illegible], the alderman argued, Clough had really fired laborers from Foster, not from Maine as he contended.[20]

Whatever the validity of any or all these reasons, Clough was replaced in 1883. Soon afterwards, according to people now living who knew Clough, he became the Commissioner of Bridges for the City and was in charge of repairs, maintenance, and alterations of the city's bridges. He apparently died in 1942 leaving no family but his wife who died soon afterwards.

Whether the designer of the Calf Pasture Pumping Station be George Clough, an anonymous city draughtsman, or someone else, the building itself expresses much which is common to municipal buildings prevelant in the United States at that time. One can only classify the style as eclectic: elements from a number of historical styles were combined to form a building which was pleasing to the eye of the day. The pumping station has elements of Medieval, Renaissance, French and what might be called 19th century rail terminal architecture in it. The castellated turrets, joined to a rustical Italian Palazzo base with Renaissance balastrades, what appears to be classical fretwork, the large board arch reminiscent of the work at Gare de l'est and the steep Mansard roof are all com-

In all fairness, it must be pointed out that the building does respond on a number of accounts to functional needs. Because of the size of the massive pumps mentioned previously, a great volume was needed. The volume is allowed to vary in height according to which pumps it houses. Over the two Worthington pumps, which were low and squat, the roof is low and squat. Over the Leavitt pumps which were [illegible], the roof rises accordingly. Because of the ever present odor that goes with sewerage, the architect probably designed the high central Mansard roof as a way of carrying that odor up and away from the floor area where the men worked. The four castellated turrets, besides housing circular stairs for access to the roof, were equipped with large, remotely operated dampers to adjust air flow and, taking advantage of prevailing winds, provide ventilation and natural air-conditioning for the space below. The fact that the building was located on a point of land at the ocean's edge and would probably be subject to a tremendous pounding during frequent Northeasters was quite possibly a factor in the architect's choice of a heavy bulky form. In addition, the heavy stone work might have been necessary to keep the building in equilibrium. The footings for the building are thirty-five feet below grade and approximately fourteen feet below sea level. In order to form the foundations a huge six foot thick mat of timber was placed at the bottom of the excavation for the station. It may have been that a heavy structure was

level during high or abnormal storm tides.

Good lighting for the workmen who ran and serviced the pumps was also a factor apparently considered in this design. Although now boarded up, the windows that exist would obviously provide good overall lighting to the interior, which is one vast volume. There is no point in the building that could not be reached by strong natural light during the days when the windows were uncovered. At night, the pumps were illuminated by a marvelous system of lights which were both functional and attractive, expressing the pride of the city in its gigantic pumping machinery.

There is a considerable problem of scale in this building. p. 24 It is very hard to visualize the size of the building from a distance or through a photograph. One would assume it to be smaller than its rather impressive dimensions: eighty feet high, two hundred feet long and seventy feet wide. This ambiguity probably results from the general lack of understanding architects of this time had of the giganticism of the Machine Age, and what forms architecture could use to respond to it. This was a building designed for the scale of the machine and not man. It must be remembered that the pumping station was designed ten years before the Galleries des Machines at the Paris Exposition of 1889, and by architects not yet exposed to the more intellectual approaches of form and function such as expressed by Eiffel in his bridges. One could hardly expect a Galleries des Machines to come out

It cannot be said that there was a specific precedent from which this building was copied or which influenced it [illegible] of the period, it is not hard to see the temper of the times. Reference to builder's guides and catalogues of the period reveals notable similarities with other buildings.[23] No doubt the architect was following the idiom of the day and was unaware of any conscious stylistic [illegible].

Today, the Calf Pasture Pumping Station is used merely as a back up with most of the City's sewerage being handled under contract by the M.D.C. at Deer Island. The large steam powered pumps have been replaced with smaller electric pumps making the building volume seem even more immense and empty. Most of the windows are boarded up and the roof leaks, a product of attempts to rid the building of flocks of pigeons living in the rafters. Attendants armed with shot guns have periodically made forays into the upper catwalks and fired away victimizing pigeons and roofing alike.

The building which once dominated the area now huddles like a gray old man in the shadow of the new University of Massachusetts campus, and the Columbia Point housing project. It is relic of an age past and may soon be demolished. But, it still clings to a tenuous claim for life. There is a certain romance to the building, a romance that draws attention to the past and its seemingly naive yet simple approach to architecture and modern life in [illegible].

building's history. They talk for hours with pride of the [illegible] of the building in its heyday, and the marvels of the machinery it housed. For the more adventuresome, explorations along the cat-walks among the huge roof trusses and up the iron spiral stairs to the top of the turrets increases the understanding of what the workers know the building used to be. [illegible] have expressed a desire to see the building find a new use, perhaps a gymnasium for the nearby campus and housing projects, or even a museum of technology to house the antiquated machines of its earlier years. Certainly a volume that size could be adapted to serve the city in some new capacity.

1. [illegible], Public Drainage Works of the City of Boston ([illegible]) (Boston: Rockwell and Churchill, City Printers, 1885, 2nd edition), p. 14.

2. Ibid, 14.

3. Boston City Council Report of Proceedings for the Municipal Year 1877 (Boston: Rockwell and Churchill, City Printers, 1877), p. 566.

4. Ibid, 566.

5. Boston City Council Report of Proceedings for the Municipal Year 1876 (Boston: Rockwell and Churchill, City Printers, 1876), p. 243.

6. City Council Report of Proceedings, 1877, p. 279.

7. Clerk, 89-90.

8. American Architect's and Building News (Boston: James R. Osgood and Co., 1876, 1879, 1891), 1878 Vol. III, p. 9-10, 1879 Vol. VI, p. 59, [illegible] Vol. IX, pp. 193, 194.

9. Clark, 61.

10. Boston City Council Report of Proceedings for the Municipal Year 1878 (Boston: Rockwell and Churchill, City Printers, 1878), pp. 37 and 42.

11. Boston City Council Report of Proceedings for the Municipal Year 1882 (Boston: Rockwell and Churchill, City Printers, 1882), p. 223.

12. Ibid, 236.

13. Drawings are on file at the Department of Sewers, City Hall, Boston.

14. Clark, plate X.

15. Interview with Mr. Lawrence McCloughlin, engineer Calf Pasture Pumping Station (Columbia Point, Dorchester, Mass., October 24, 1972).

16. Indirect references in Boston City Council Reports of Proceedings indicate that construction was carried out by the Quintard Iron Works of New York, N.Y.

17. Boston City Council Report of proceedings for the Municipal [illegible] (Commissioners Howell and Churchill, City Printers, 1920), p. 228.

18. Boston City Council Report of proceedings for the Municipal [illegible] (Churchill, City [illegible]), p. 5.

19. Ibid, 110-112.

20. Idem.

21. [illegible] Division of the Department of Public Works (City Hall, Boston, Mass., October 13 and 19, 1972). Mr. Skinner knew and worked for George Clough early in his career.

22. Interview with Mr. Frank McCarthy, engineer Calf Pasture Pumping Station (Columbia Point, Dorchester, Mass., October 7, 1972).

23. American Architect's and Builder's Journal Vol. IX and X.

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[illegible] (Boston: [illegible]), pp. 9-10; VI (June, [illegible]), p. [illegible]; [illegible] (December, 1881), pp. 195, 196; [illegible]).

[illegible] builder's news was of minimal value in [illegible] the Pumping Station itself, since its only direct references were to the sewerage system's design and construction. Its most useful capacity was [illegible] current trends in style to which the Pumping Station could be compared.

Boston City Council Report of Proceedings for the Municipal Years [illegible], 1872, 1878, 1880, 1882, and 1883, Boston: [illegible] Churchill, City Printers.

City Council Reports were sketchy and fragmented in their references to the Pumping Station. Their most significant worth was the account of George Clough's career as City Architect.

Clark, Eliot C., Main Drainage Works of the City of Boston, Boston: Rockwell and Churchill, City Printers. 1885.

Clark's book was written as a final report to the City by the Boston Improved Sewerage System Committee. It was the most complete source on both the system and the Pumping Station that was located. For the most part it dealt with the system, with one chapter being devoted to the Pumping Station itself. The information was physically descriptive, but without detail historically; e.g. at no point did it confirm George Clough as the architect.

Interviews with Mrs. McCloughlin, McCarthy, and Skinner.

Personal interviews provided excellent background information and confirmed information from other sources. Very little specific data was gained directly from interviews, since most information was recollection of general impressions and not a result of close association with the design or construction processes.

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Original Photographs: A. Rudak, B. Burke, Figs. 1, 15, 18, 19, 24, 26